Appendix D

West Maury DEIS

Best Management Practices

Application of Water Quality BMPs, INFISH, and LRMP Standards and Guidelines

A number of the mitigation measures described in Chapter 2 of the EIS, and procedural steps done in development of these projects, are identified as Best Management Practices (BMPs). BMPs also include requirements such as Forest Service manual direction, timber sale contract provisions, environmental documents, and Forest Plan standards and guidelines. The Forest Plan was amended by the Inland Native Fish (INFISH) Strategy in July 1995. Applicable INFISH standards are also identified.

The Forest Plan, as amended, guides natural resource management activities and establishes management standards and guidelines for the Ochoco National Forest. The Forest Plan requires compliance with State requirements in accordance with the Clean Water Act through the application of BMPs. The Environmental Protection Agency has certified the Oregon Forest Practices Act and regulations as BMPs. The State of Oregon has compared Forest Service practices with the State practices and concluded that Forest Service practices meet or exceed State requirements.

The following table describes design elements and other aspects of the project development process and identifies those design elements which are applied as site-specific BMPs and INFISH standards.

West Maury Project – Mitigation Measure, Design Element, or Procedural Requirement	**BMP/INFISH Reference**
Analysis and scheduling timber sale activities to avoid potential effects on water quality. Though not a priority watershed, the Maury Mountains Watershed Analysis was completed in 2001. Water quality and stream channel condition was identified as a key issue in the watershed analysis and partly as an issue in the West Maurys Project EIS.	**T-1**: Timber Sale Planning Process Objective: To introduce water quality and hydrologic considerations into the timber sale planning process. **INFISH RF-2a**: Roads Management Completing watershed analysis prior to construction of new roads or landings in RHCA's within priority watersheds.
Timber harvest units and other activities were evaluated to estimate the response of the watershed. The IDT reviewed each treatment unit including factors influencing potential for impacts to water quality such as EHA, soil erosion hazard, slope, landslide prone area, distance to stream, logging method, and effects to forest vegetation. Adjustments were made to silvicultural prescriptions and fuel treatments.	**T-2**: Timber Harvest Unit Design Objective: To ensure that timber harvest unit design will secure favorable conditions of water flow, water quality, and fish habitat.

West Maury Project – Mitigation Measure, Design Element, or Procedural Requirement	BMP/INFISH Reference
The potential for erosion and mass wasting for the area was evaluated by examining the soil, topography, rock type, drainage patterns, water conditions, and plant community. Water Quality Report, Geology Report, Soils Report. Areas with high erosion potential were identified and used to design treatments which reduced erosion potential.	**T-3**: Use of Erosion Potential Assessment for Timber Harvest Design. Objective: To prevent downstream water quality degradation by the timely identification of areas with high erosion potential and adjustment of harvest unit design.
Based on the Forest GIS layer and data collected during the planning process and sale layout, the location of stream courses, springs, wet meadows, and RHCAs are delineated. In addition, sites identified during implementation will be reviewed by applicable resource specialists for protection needs. EIS Map 13 of 18	**T-4:** Use of the Sale Area Map for designating Water Quality Protection Needs Objective: To delineate the location of protection areas and available water sources as a guide for both the purchaser and the sale administrator, and to ensure their recognition and proper consideration and protection on the ground.
The IDT addressed normal operating season for timber harvest operations, during which, operations may generally proceed without resource damage. Design elements also describe road conditions which would restrict timber hauling. Reference EIS Chapter 2, Mitigations, Design Criteria, and Resource Protection Measures.	**T-5**: Limiting the Operating Period of Timber Sale Activities Objective: To ensure that purchasers conduct operations in a timely manner and conduct operations within the time period specified in the timber sale contract. **INFISH RM-2 c5:** Regulate traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives.
Unstable lands that are unsuitable for timber management were identified through satellite imagery, aerial photos, and field reconnaissance. Reference EIS Chapter 3, Geology Report.	**T-6**: Protection of Unstable Lands Objective: To provide for identification and appropriate management prescriptions for unstable lands.

West Maury Project – Mitigation Measure, Design Element, or Procedural Requirement	**BMP/INFISH Reference**
Roads, skid trails, landings, and other timber harvesting facilities would be kept at a prescribed distance from designated stream courses. INFISH RHCAs have been identified for all streams within the West Maury Planning Area. Proposed treatments within RHCAs are intended to meet INFISH RMOs. Reference EIS Chapter 2, Water Quality Report, and Fisheries Report.	**T-7**: Streamside Management Unit (SMU) Designation Objective: To designate a riparian area or zone along streams and wetlands where prescriptions are made that will minimize potential adverse effects of nearby logging and related land disturbance activities on water quality and beneficial uses. **INFISH:** RHCA Designation **INFISH TM-1b:** Apply silvicultural practices for RHCAs to acquire desired vegetation characteristics where needed to attain RMOs. Apply silvicultural practices in a manner that does not retard attainment of RMOs and that avoids adverse effects on inland native fish.
EIS Design Elements - Water Quality/Fisheries The road system to access sale units was designed so to minimize stream crossings. There is one new system road stream crossing in Alternatives 2 and 3. There is one stream crossing on a previous temporary road location in Alternative 2. EIS Design Elements - Soils Skid trails would be designated and approved prior to logging and would be located on already disturbed areas where possible. There will be no heavy equipment or skid trails in RHCAs.	**T-8**: Streamcourse Protection a. Location, method, and timing of streamcourse crossings must be agreed to prior to construction Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow, and (3) to prevent sediment and other pollutents from entering streams.

West Maury Project – Mitigation Measure, Design Element, or Procedural Requirement	**BMP/INFISH Reference**
EIS Design Elements - Water Quality/Fisheries Skid trails and the use of ground-based machinery for logging operations would not be allowed within RHCAs. No new temporary roads would be located within RHCAs.	**T-8**: Streamcourse Protection d. Equipment shall not operate within SMUs (RHCAs) or protected streamcourses, as identified on the sale area map. Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow, and (3) to prevent sediment and other pollutents from entering streams. LRMP S&G: No more than 10% of an activity area (Riparian MA-F15) can be compacted or displaced to a degree which degrades vegetative productivity.
EIS Design Elements - Water Quality/Fisheries Adequate drainage would be established on roads. Filter strips below drainage structures would be of sufficient size to catch sediment before runoff enters streams. New native surface and temporary roads would be designed with relief drainage (drivable dips, outslope, no berms). Drainage will be maintained during operations and be fully functional going into the winter and when roads are decommissioned or inactivated.	**T-8**: Streamcourse Protection f. Water bars and other erosion control structures will be located so as to prevent water and sediment from being channeled into streamcourses, and to dissipate concentrated flows. Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow, and (3) to prevent sediment and other pollutants from entering streams.
EIS Design Elements - Water Quality/Fisheries Full suspension will be used over riparian areas. Cable corridors, approximately 15 feet wide, may need to be cut through an occasional stream crossing. When full suspension cannot be gained over riparian areas, logs will be pulled away from the stream to the landing.	**T-8**: Streamcourse Protection g. Logs will normally be fully or partially suspended in cable log harvesting operations within the Streamside Management Unit (SMU) of protected streamcourses. Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow, and (3) to prevent sediment and other pollutants from entering streams.
EIS Design Elements - Water Quality/Fisheries Proposed units were evaluated by the IDT for suitability for tractor logging based on slope, soil erosivity, geologic stability, and distance from streams Slopes over 35% in Tractor units have been identified.	**T-9**: Delineating Tractor Loggable Ground Objective: To protect water quality from degridation caused by tractor logging ground disturbance

West Maury Project – Mitigation Measure, Design Element, or Procedural Requirement	**BMP/INFISH Reference**
EIS Design Elements - Water Quality/Fisheries There would be no new construction of landings within RHCAs, to reduce effects, existing landings may be reused if not contributing to water quality degradation.	**T10**: Log Landing Location Objective: To locate landings in such a way as to minimize creation of hazardous watershed condition.
EIS Design Elements - Soils Skid trails would be designated and approved prior to logging and would be located on already disturbed areas where possible. Skid trails, landings, and roads would be designed to minimize the aerial extent of the activity. Objective is 20% or less of activity area in a detrimental soil condition.	**T-11**: Tractor Skid Trail Location and Design Objective: To minimize the area compacted, erosion, and runoff water.
EIS Design Elements - Soils For tractor yarding units, the leading end of logs would be suspended above the ground during skidding operations to limit soil displacement. If slopes should exceed 35%, end lining would be required to minimize detrimental soil impacts. Slopes over 35% in tractor units were identified.	**T-12**: Suspended Log Yarding in Timber Harvesting Objective: 1. To protect soils from excessive disturbance, and 2. to maintain the integrity of SMU (RHCA) and other sensitive watershed areas.
EIS Design Elements - Water Quality/Fisheries Effective ground cover would be established on deactivated and decommissioned roads within RHCAs to minimize sedimentation. An erosion control plan would be developed that incorporates applicable erosion control actions for all Action Alternatives and made part of the timber sale contract.	**T-13**: Erosion Prevention and Control Measures During Timber Sale Operations Objective: To ensure that the purchaser's operations shall be conducted to minimize soil erosion.

West Maury Project – Mitigation Measure, Design Element, or Procedural Requirement	**BMP/INFISH Reference**
EIS Design Elements - Water Quality/Fisheries When consistent with other management actions, slash may be placed on skid trails, temporary roads, roads proposed to be decommissioned, and roads proposed to be inactivated when yarding is completed. EIS Design Elements - Noxious Weeds Revegetate temporary roads, landings, and other disturbed areas as soon as possible to reduce the potential for weed establishment and soil erosion.	**T-14**: Revegetation of Areas Disturbed by Harvest Activities Objective: To establish a vegetative cover on disturbed sites to prevent erosion and sedimentation.
EIS Design Elements - Water Quality/Fisheries Landings and temporary roads will be ripped, water barred, and seeded as needed to prevent and control erosion.	**T-15**: Log Landing Erosion Prevention and Control Objective: To reduce the impacts of erosion and subsequent sedimentation, on log landings, by use of mitigation measures. **T-16**: Erosion Control on Skid Trails Objective: To protect water quality by minimizing erosion and sedimentation derived from skid trails.
Meadows, seeps, and springs have been identified through satellite imagery, aerial photos, and field verification. Wet meadows are afforded protection by the application of INFISH RHCAs. Dry meadows are protected from impacts from harvest and road activities. Aspen and cottonwood management is proposed to improve stand vigor.	**T-17**: Meadow Protection During Timber Harvesting Objective: To avoid locating roads, landings, and skid trails in meadows.
EIS Monitoring Common to All Action Alternatives Timber sale administration will include monitoring for implementation of activities as planned including: harvest operations, road work, erosion control, and fuels treatment. Inspections of road drainage conditions following storm/runoff events would be done under the action alternatives. Maintenance would be scheduled as needed.	**T-18**: Erosion Control Structure Maintenance Objective: To ensure that constructed erosion control structures are stabilized and working. **INFISH RF-2 c4:** Requirements for pre-, during, and post-storm inspections and maintenance.

West Maury Project – Mitigation Measure, Design Element, or Procedural Requirement	**BMP/INFISH Reference**
These BMPs are included in Alternatives 2 and 3 for Timber Sale activity. T-19 and T-21 are considered normal operating procedures and are included in timber sale contract language. T-20 is required per Forest Service Manual requirements. T-22 is provided for through monitoring and evaluation of conditions throughout the life of the timber sale contract.	**T-19:** Acceptance of TS Erosion Control Measures Before Sale Closure **T-20:** Reforestation **T-21:** Servicing and Refueling of Equipment **T-22:** Modification of TSC **INFISH RA-4:** General Riparian Area Management Prohibit storage of fuels and other toxicants within RHCAs.
EIS, Chapter 2, Alternatives There are key differences among the alternatives for transportation system development and road management. Alternative 2 proposes building 5.8 miles of new system road and 5.3 miles new temporary road, reopening 16.9 miles, and reusing 5.5 miles of old temporary road. Alternatives 3 proposes building 3.0 miles of new system road and 5.0 miles new temporary road, reopening 14.5 miles, and reusing 4.3 miles of old temporary road. There is no road construction or reconstruction in Alternative 4. Alternatives 2, 3 and 4 propose decommissioning 3.44, 2.54 and 3.44 miles of existing road in RHCAs respectively. The road management proposed under Alternatives 2 and 3 would reduce the potential for sediment delivery in streams in the long-term.	**R-1**: General Guidelines for the Location and Design of Roads a. Basic requirement for transportation facility development which best meets management objectives with least effect on environmental values.
Road management activities including: construction, reconstruction, inactivation, decommission, temporary roads, and use are identified as key factors affecting water quality and fish (reference EIS Chapter 1, Key Issue – Water Quality). During development of the EIS, the design and location of existing and proposed roads was evaluated by the IDT.	**R-1**: General Guidelines for the Location and Design of Roads b. Interdisciplinary team evaluates effects of transportation system design and road location. **INFISH RF-2 c1:** Road design criteria, elements, and standards that govern construction and reconstruction are identified.
EIS Design Elements - Water Quality/Fisheries An erosion control plan is required by contract provisions common to road construction.	**R-2**: Erosion Control Plan Objective: To limit and mitigate erosion and sedimentation through effective planning to initiation of road construction activities and through effective contract administration during construction.

West Maury Project – Mitigation Measure, Design Element, or Procedural Requirement	**BMP/INFISH Reference**
Scheduling operations during periods when the probability of rain and runoff are low. Contractors are to schedule and conduct operations to minimize erosion.	**R-3**: Timing of construction Activities Objective: To minimize erosion by conducting road construction operations during minimal runoff periods.
EIS Design Elements -Water Quality/Fisheries Cut and fill slope design, surface and subsurface drainage, and surfacing needs were considered in the development of the road designs.	**R-4**: Road Slope Stabilization Objective: To reduce sedimentation by minimizing erosion from road slopes and minimizing the chances for slope failures along roads.
EIS Design Elements - Water Quality/Fisheries Road associated sediment is identified as a key factor affecting stream sedimentation. The alternatives include several design elements aimed at reducing the potential for sediment delivery from roads. Alternatives 2 and 3 require installation of straw bale sediment traps during operations in the wet season.	**R-7**: Control of Surface Road Drainage Associated with Roads Objective: 1. To minimize the erosive effects of water concentrated by road drainage features, 2. to disperse runoff from or through the road, and 3. to minimize the sediment generated from the road. **INFISH RF-2d:** avoiding sediment delivery to streams from the road surface.
EIS Alternative Development, Chapter 2 Alternatives 2, 3 and 4 reduce the amount of open road miles within 400 feet of streamcourses. Hydrologic function would be restored on these roads. Stream crossing culverts and cross drain culverts will be removed on roads being decommissioned. Stabilize fill slopes and control water runoff to minimize the movement of sediment into streamside management units.	**R-12**: Control of Construction in Streamside Management Units (RHCAs) Objective: To reduce the adverse effects of sediment from nearby roads on slope stability, vegetation, and aquatic resources along a designated stream zone. **INFISH RF-3c:** Closing and stabilizing or obliterating, and stabilizing roads not needed for future management activities.
EIS Design Elements - Water Quality/Fisheries A water conservation plan was developed for the forest to maintain base flows. This plan would be followed under the action alternatives.	**R-17**: Water Source Development Consistent with Water Quality Protection Objective: To supply water for roads and fire protection while maintaining existing water quality.
EIS Design Elements - Water Quality/Fisheries Scarification of temporary roads, primary skid trails and landings is included in Alternatives 2 and 3.	**R-23**: Obliteration of Temporary Roads and Landings Objective: To reduce sediment and restore productivity of the land at the completion of intended use.

West Maury Project – Mitigation Measure, Design Element, or Procedural Requirement	**BMP/INFISH Reference**
EIS Design Elements - Water Quality/Fisheries Proposed road reconstruction was evaluated for designs that would reduce the potential for sediment delivery.	**INFISH RF-3a:** reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or do not protect the watershed from increased sedimentation.
Fire severity regimes are described for the area in the Maurys Watershed Analysis and in the Fire/Fuels Resource Report**.** The effects of the alternatives are described for Fuels in the EIS, Chapter 3.	**F-1**: Fire and Fuels Management Objective: An objective of fire management activities is to reduce the potential public and private losses which could result from wildfire and/or subsequent flooding and erosion, by reducing the intensity and destructiveness of wildfire.
EIS Design Elements - Water Quality/Fisheries Alternatives 2, 3 and 4 include design elements which reduce the effects of prescribed fire on water quality.	**F-2**: Consideration of Water Quality in Formulating Prescribed Fire Prescriptions Objective: To provide for water quality protection while achieving the management objectives through the use of prescribed fire.
Cumulative effects of proposed actions, past actions, and reasonably foreseeable future actions are included in the analysis. EIS Chapter 3.	**W-5**: Cumulative Watershed Effects Objective: To protect the beneficial uses of water and streams from the cumulative effects of multiple management activities which may result in adverse (degraded) water quality or stream habitat conditions.
EIS Design Elements - Soils If slopes should exceed 35 percent on portions of tractor units, end lining would be required to minimize detrimental soil impacts. Slopes over 35% in tractor units have been identified.	**VM-1**: Slope Limitations for Tractor Operations Objective: To reduce gully and sheet erosion and associated sediment production by limiting tractor use.
EIS Design Elements - Water Quality/Fisheries Wetlands and meadows are delineated within the project area. Springs, seeps, streams, and wet meadows have associated RHCA's applied. No off road ground-based harvest operations are proposed within RHCA's.	**VM-2**: Tractor Operation Excluded from Wetlands and Meadows Objective: To limit turbidity and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion.
EIS Design Elements - Noxious Weeds Revegetate roads, landings, and other disturbed areas as soon as possible to reduce the potential for weed establishment and soil erosion.	**VM-3**: Revegetation of Surface Disturbed Areas Objective: To protect water quality by minimizing soil erosion through the stabilizing influence of vegetation.

West Maury Project – Mitigation Measure, Design Element, or Procedural Requirement	**BMP/INFISH Reference**
EIS Monitoring Common to All Action Alternatives Implementation monitoring and Water Quality monitoring to evaluate the effectiveness of BMP's and INFISH standards and guidelines is included for all the action alternatives.	**W-7:** Water Quality Monitoring Objective: To determine effects of land management activities on the beneficial uses of water; to monitor baseline watershed conditions for comparison with State Water Quality standards, Forest Plan standards, and estimation of long-term trends; to ensure the health and safety of water users; to evaluate BMP effectiveness; and to determine the adequacy of data, assumptions, and coefficients in the Forest Plan. **INFISH Monitoring**: Monitoring is an important component of the proposed interim direction. The primary focus is to verify that the standards and guidelines were applied during project implementation.
Maurys Watershed Analysis A watershed analysis was completed for the Maurys in 2001. Hydrologic character, stream channel condition, and water quality are key issues and receive emphasis in the report. The watershed analysis was used as a base for describing the purpose and need for action in the West Maurys Project .	**INFISH Watershed Analysis** Watershed analysis is a systematic procedure for determining how a watershed functions in relation to its physical and biological components. This is accomplished through consideration of history, processes, landform, and condition.
EIS, Alternative Description, Chapter 2 Alternatives 2, 3 and 4 propose riparian restoration treatment prescriptions in areas where aspen occurs within treatment units. Long-term improvement in water quality is also expected, under Alternatives 2, 3 and 4, due to the proposed road decommissioning. Alternative 2, 3 and 4 treat fuel loadings at different levels to reduce the risk of high intensity fire in RHCAs.	**INFISH Watershed Restoration** Watershed restoration comprises actions taken to improve the current conditions of watersheds to restore degraded habitat, and to provide long-term protection to natural resources, including riparian and aquatic resources. **INFISH WR-1:** Watershed and Habitat Restoration Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserves genetic integrity of native species, and contributes to attainment of RMO's.